



National Environmental Health Association

303-756-9090
720 S. Colorado Blvd., Suite 1000-N, Denver, CO 80246-1926
staff@neha.org

The National Environmental Health Association (NEHA) represents more than 6,700 governmental, private, academic, and uniformed services sector environmental health professionals in the U.S. and its territories and internationally. NEHA is the profession's strongest advocate for excellence in the practice of environmental health as it delivers on its mission to build, sustain, and empower an effective environmental health workforce.

NEHA Policy Statement on Research and Innovations That Enhance Environmental Health Science and Practice

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The National Environmental Health Association (NEHA) advocates for national, state, and local policies, regulations, research, and resources that will enhance the ability of environmental health professionals to contribute to and benefit from advances in environmental health science and practice. Such advances might be due to new and emerging technologies and ideas that enhance the ability to protect public health. NEHA supports the following policies and actions:

- Inform and educate NEHA members about the importance of research and development in advancing capabilities in environmental health science and practice to drive action.
- Educate NEHA members about the importance of participating in environmental health research and development systems by recognizing and expressing needs to improve the science and applied practices and providing ideas and requirements to research communities.
- Partner and collaborate with national and international research and development organizations or grant sponsoring foundations that develop ideas, materials, processes, and equipment that enhance environmental health science and practice to protect public health.
- Promote research, basic through applied, that strengthen the scientific basis for environmental health practice and decision making to advance cross-disciplinary translational research that reflects environmental health.
- Promote innovations in environmental health-related technology, including the development of instruments and equipment that detect, measure, and analyze hazardous environmental agents and conditions.

- Host innovation research and development promotion activities that advance translational science partnerships, nontraditional partnerships, and cross-disciplinary leadership.

Analysis

Throughout the world's history, people have sought to improve their living conditions, prevent disease, and prolong life. Sanitary and environmental health knowledge and practices apply systems and tools to achieve these means. Innovation, invention, and associated thought processes have been foundational to the growth and relevance of the environmental health profession and practice. There has been a broad spectrum of novel discoveries and technical developments and enhancements, including laboratory and field-based testing methods; field analytical equipment development; enhancements to risk assessment and risk management procedures; engineering improvements to waste, air quality, and soil management systems to minimize or prevent pollution; improved personal protection equipment; real time digital communication and data collection methods; and training a culturally diverse workforce. These discoveries foster the science and practice applied by environmental health and sanitarian professionals to improve the public's health and prevent injury and disease.

Environmental health and sanitation professionals are important resources for recognizing where innovations, inventions, and improvements are needed as they can articulate and document the shortcomings of current equipment and practices, or recognize where something is needed to fill a void. Innovation and invention translate into better prepared environmental health and sanitation professionals with optimum capabilities to anticipate, recognize, and evaluate potential or actual adverse environmental health hazards, as well as offer control solutions to prevent or minimize disease, injury, or death and, therefore, protect the public's health.

Justification

Led by the U.S. Department of Health and Human Services, the U.S. government established the Healthy People initiative that provides science-based, 10-year national objectives for improving the health of all Americans. Health People 2020 is the most current iteration of the effort and it, as well as prior versions, recognizes the need to promote health for all through a healthy environment. Environmental health, therefore, is a component of the initiative. Citing World Health Organization statistics (Prüss-Ustün, Wolf, Corvalán, Bos, & Neira, 2016), the HealthyPeople.gov (2020) Environmental Health website acknowledges that globally, 23% of all deaths and 26% of deaths among children under 5 years old are due to preventable environmental factors. They also indicate that "maintaining a healthy environment is central to increasing quality of life and years of healthy life." It should be obvious that research and innovation is a part of the process and actions necessary to advance environmental health science and practice to increase quality of life and years of healthy life.

Given that NEHA's mission is to "advance the environmental health professional for the purpose of providing a healthful environment for all," and in the spirit of Health People 2020, it is reasonable, therefore, for the organization to interact with, participate in, and even influence the processes and systems associated with research, development, and innovation. The following table lists several examples of environmental health inventions and innovations and the associated public health impacts.

Examples of Environmental Health Inventions and Innovations With Associated Public Health Impacts			
Examples of Environmental Health Areas	Technology and Innovation Examples	Impact on Public Health	References
1. Occupational Environment	<p>Wet bulb globe temperature (WBGT) meter</p> <p>Measures level of heat exposure in hot environments.</p>	Prevents or minimizes the occurrence of heat illness/injury. Identifies the need for appropriate protective measures to prevent adverse heat-related health outcomes (e.g., heat stroke and heat exhaustion).	Ramsey & Beshir, 1997
	<p>Sound level meter (SLM) and noise dosimeter (ND)</p> <p>Measures exposure to noise. The SLM measures the sound level in an area. The ND calculates the daily noise dose based upon measurements taken during a work shift.</p>	Prevents or minimizes social causes of hearing loss in contrast to age-related causes. Identifies the need for appropriate protective measures to prevent adverse noise/sound-related health outcomes (e.g., high frequency hearing loss).	Bruce, Bommer, & Moritz, 1998
2. Instrumentation	<p>Hazardous Air Pollutants on Site (HAPSITE) Extended Range (ER)</p> <p>A person-portable gas chromatograph/mass spectrometer that provides quick qualitative and quantitative measures of various toxic chemicals.</p>	Identifies the need for appropriate protective and preventive measures to prevent chemical toxicity.	Kwak, Fan, Grigsby, & Ott, 2014
3. Drinking Water Management	<p>Environmental sentinel biomonitor system</p> <p>Rapidly identifies toxic chemicals in potential drinking water sources.</p>	Helps provide safe drinking water to military units in the field.	Widder et al., 2008

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4. Policy/Procedure	<p>Health risk assessment</p> <p>Establishes a standard process for assessing health risks from exposure to contaminants, including hazard identification, dose response assessment, exposure assessment, and risk characterization.</p> <p>Identifies risk assessment as separate process from and not influenced by risk management.</p>	Provides health-based exposure limits that protect public health for environmental standards (e.g., Clean Air Act, Safe Drinking Water Act, etc.).	National Research Council, 1983
5. Information Technology (IT)/ Software	Mobile applications, QR readers, computer mapping (GIS), satellite tech for latitude/longitude Earth positioning (GPS)	Provides digital information collection, analysis, management, and tracking tools for environmental health professionals to communicate routinely to the broad spectrum of association stakeholders.	Centers for Disease Control and Prevention (CDC), 2020; Eastern Research Group, 2020; Esri, n.d.; U.S. Environmental Protection Agency (U.S. EPA), 2020; U.S. Department of Health and Human Services, 2017
6. 3D Printing	Mobile device component parts	<p>Provides a pathway for environmental health professionals or inventors to develop tools to technology to enhance instrument or field mobility. Scalable instrument production or parts replacement without costly production expenses.</p> <p>National Governors Association memorandum coordinating state-level technology advancement and surge capacity for test kits, swabs, etc.</p>	de Almeida Monteiro Melo Ferraz et al, 2018; National Governors Association (NGA), 2020, April 13; Rochester Institute of Technology, 2020; Sparkman, 2020; Stefaniak et al., 2017; U.S. EPA, 2019a

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7. Technology/ Infrared Detection	Thermal detection	Advanced detection methods for biological and chemical risk assessment, interior water damage surveys for mold growth, and building occupancy criteria. Coordinate with allied health industrial hygiene colleagues (e.g., AIHA).	AIHA, 2020; Zalma, 2018
8. Technology/ Bioluminescence	Biochemical analysis	Advanced detection methods for biological and chemical risk assessment. Helps determine qualitative presence/absence test of analyte, contaminant, or pathogen.	Rowe, Dikici, & Daunert, 2009
9. Personal Protective Equipment	Barrier protection against biological or chemical agents	Provides public health employees with different levels of protection based on their potential exposure to hazards, including gloves, masks, gowns, body suits, respirators, and face shields.	NGA, 2020, April 15 Companies such as 3M, DuPont, Cardinal Health, Grainger, and McKesson Corporation
10. Technology/UV Light	Radiation surface treatment	Provides sterilization methods to reduce the COVID-19 pathogen on contact surfaces.	Henry Ford Health System, 2020
11. Vaccine	Convalescent blood plasma	Draws plasma antigens from recovered patients to develop potential antigen treatment for newly diagnosed COVID-19 patients	NHS Blood and Transplant, 2020
12. Software	Model Aquatic Health Code (MAHC) Aquatic Inspector iPad app	Provides a digital version of the MAHC's inspection form, along with embedded MAHC text. Allows environmental health practitioners to integrate the Centers for Disease Control and Prevention's latest and best practices into routine, follow-up, and investigative inspections of public treated aquatic venues.	CDC, 2018

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13. Software	EJSCREEN	Environmental justice mapping and screening tool, that provides U.S. EPA with a nationally consistent data set and approach for combining environmental and demographic indicators. It provides demographic and environmental information for a chosen area.	U.S. EPA, 2019b
14. Software/e-learning	TRAIN	National learning network that provides quality training opportunities for professionals who protect and improve the public's health.	TRAIN, n.d.
15. Food Safety and Sanitation	Thermometry, pocket bimetal dial thermometer, thermocouple thermometer, thermister thermometer, infrared thermometer	Tools used to evaluate the potential for temperature abuse during food storage, preparation, and service. These tools can also be used to assess the ability to prevent the growth of pathogenic and toxigenic microorganisms in food.	Knechtges, 2018; Powitz, 2006

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Drafted by: NEHA Committee Members

Santiago Ezcurra Mendaro, Media Producer/LMS Administrator, Entrepreneurial Zone, NEHA, Denver, CO

Nikki Lemin, REHS, NEHA Region 6 Vice-President, Assistant Health Commissioner/Director of Environmental Health, Franklin County Public Health, Columbus, OH

Hannah Roberts, Student, University of Georgia, Athens, GA

Welford Roberts, PhD, DLAAS, RS/REHS, NEHA Past-President (2009–2010), South Riding, VA

LCDR James Speckhart, MS, REHS, USPHS, NEHA Region 8 Vice-President, Environmental Health Officer, Food and Drug Administration, Silver Spring, MD

Sharon Unkart, PhD, Associate Director, Entrepreneurial Zone, NEHA, Denver, CO